

CLAIMS

What is claimed is:

- 1 *2nd claim* 1. A customer profiling apparatus for conducting customer behavior pattern analysis, comprising:
 - 3 processing circuitry operative to process customer records;
 - 4 a data warehouse coupled with the processing circuitry and
 - 5 configured to store the processed customer records;
 - 6 a profiling engine communicating with the data warehouse and
 - 7 operative to build and update customer behavior profiles by mining the customer records that flow into the data warehouse; and
 - 8 at least one computer program, performed by the profiling engine,
 - 9 and operative to define behavior profiles as data cubes and derive similarity
 - 10 measures on patterns extracted from the behavior profiles.
- 1 2. The apparatus of claim 1 wherein the profiling engine is an OnLine Analytical Processing (OLAP) based scalable and flexible profiling engine.
- 1 3. The apparatus of claim 1 wherein the profiling engine comprises a commercial data warehouse server and a multi-dimensional OLAP server.
- 1 4. The apparatus of claim 1 wherein the profiling engine implements multi-level, multi-dimensional pattern analysis and comparison.
- 1 5. The apparatus of claim 1 wherein the behavior profiles are defined at least in part by probability distributions.
- 1 6. The apparatus of claim 1 wherein similarity measures are defined and computed on the patterns extracted from the behavior profiles.

1 7. The apparatus of claim 1 wherein the computer program is
2 further operative to compare the data cubes with similarity measures identifying
3 fraud so as to extract fraud detection from the behavior profiles.

1 8. The apparatus of claim 1 wherein the customer records
2 comprise customer communication call records, and the behavior profiles are
3 derived from telephone call data.

1 9. The apparatus of claim 8 wherein the behavior profiles are
2 analyzed to detect caller fraud.

1 10. The apparatus of claim 1 wherein the customer records
2 comprise customer call records, the profiling engine builds and updates
3 customer calling behavior profiles by mining the customer call records, and the
4 computer program derives similarity measures on patterns extracted from the
5 call behavior profiles.

1 11. A profiling apparatus, comprising:
2 a data warehouse for storing customer records;
3 a profiling engine communicating with the data warehouse and
4 operative to generate customer behavior profiles from the customer records
5 within the data warehouse; and
6 a computer application program implemented on the profiling
7 engine and operative to represent behavior profiles as patterns and derive
8 similarity measures of the patterns usable to profile customer behavior.

1 12. The apparatus of claim 11 wherein the profiling engine is
2 configured to define customer behavior profiles using probability distributions,
3 and to compute the customer behavior profiles using OLAP operations on multi-
4 dimensional and multi-level data cubes.

1 13. The apparatus of claim 12 wherein one multi-level data cube
2 comprises a profile cube.

1 14. The apparatus of claim 13 wherein another multi-level data
2 cube comprises a profile-snapshot cube.

1 15. The apparatus of claim 14 wherein yet another data cube
2 comprises an updated profile cube formed by merging together the profile cube
3 and the profile-snapshot cube.

1 16. The apparatus of claim 15 wherein the updated profile cube
2 is stored within a profile table of the data warehouse such that subsequent
3 customer profiling utilizes customer records from the data warehouse comprising
4 the updated profile cube.

1 17. A method for comparing customer behavior patterns,
2 comprising:

3 providing call data in the form of call data records to a data
4 warehouse;

5 loading the call data records into an OLAP server;

6 generating a profile-snapshot cube accommodating multiple
7 customers;

8 in combination with generating the profile-snapshot cube,
9 generating a profile cube for the same set of customers from the data
10 warehouse;

11 updating the profile cube by merging the profile cube with the
12 profile-snapshot cube; and

13 storing the updated profile cube in the data warehouse.

1 18. The method of claim 17 wherein the data warehouse
2 comprises profile tables configured to store the profile cube.

1 19. The method of claim 17 wherein the updated profile cube is
2 subdivided into a plurality of individual calling pattern cubes, each representative
3 of individual customers.

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20. The method of claim 19 further comprising the step of
performing at least one of reporting, analyzing, and visualizing of one of the
calling pattern cubes for an individual customer.

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